Q-278

SVE BULLETIN

SPECIAL VEHICLE ENGINEERING – BODY BUILDERS ADVISORY SERVICE

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2018 and later F-650/750 Stationary Elevated Idle Control

Models Affected

2018 and later Model Year (MY) F-650/750 vehicles with 6.7L Diesel and 6.8L Gasoline Engines

Purpose

To explain changes and functions of the stationary elevated engine idle control (SEIC) for power take-off (PTO), Mobile Mode PTO, and battery charge protect (BCP) applications specific to the 2018 Model Year F-650/750.

Important Update for 2018 MY and later F650/750 6.7L Diesel equipped vehicles

This bulletin contains carry-over information from SVE Bulletin Q-248 (and its revisions), This bulletin contains changes for 2018 F650/750 6.7L Diesel engine equipped vehicles including the addition of RPM limiting to Mobile PTO Mode. Please review the following information carefully to ensure proper set up and operation of the SEIC / PTO System.

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1. Overview

Stationary Elevated Idle Control (SEIC)

- A power train control module (PCM) strategy that provides elevated engine speed to drive auxiliary commercial equipment such as hydraulic pumps, generators, air compressors; or maintain vehicle battery charge under extreme electrical demands.
- SEIC is standard in all PCM's for F-650/750 trucks.
- 6.7L diesel only - Split shaft mode engages the transmission output shaft.

Customer Access Wires for SEIC and VSO/CTO/PARK Signals

- Located in cabin, tagged and bundled under the driver's side dash behind data link connector. Pass-thru wires are in the same bundle.
- The final stage manufacturer or up-fitter is required to supply the customer interface equipment.
- Additional information in the "Circuit Descriptions" section.

Transmission Power Take off (PTO) Gear and Port

- Available on F-650/750.
- Available for TorqShift™ 6-speed automatic transmission by ordering “Transmission Power Take-Off Provision”. The PTO gear is direct-splined to the torque converter impeller.
- NEVER use any sealer, especially silicone-based, on the PTO port gasket.
- TorqShift™ Automatic Transmission: On the 6.7l diesel engine, the PTO gear delivers up to 300ft-lbs of torque to the aftermarket PTO and 250ft-lbs of on the 6.8L Gasoline engine. The powertrain cooling system can manage the heat of 60 HP on the 6.7l diesel engine and 40 HP on the 6.8L gasoline engine during continuous operation. Higher horsepower can be delivered, but for shorter durations depending on the amount of power required.
- Some aftermarket PTO’s may not be capable of using the full available torque. Consult with the aftermarket PTO supplier to ensure the appropriate PTO selected for the application.

Customer Access Circuit / SEIC Wire Locations

SEIC circuits, Customer Access Signal Circuits, Pass-Thru Wires.

F650/750

Cabin / Instrument Panel

- Blunt-cut access wires for SEIC, "Customer Access" signal circuits for CTO, VS_OUT, TRO_P, TRO_N, and 2 pass-thru wires, are bundled together at the harness on the left hand side of the driver’s foot well behind the data link connector.
- Blunt-cut access wires for the 4 optional "Upfitter Switches" are also included in this bundle.

F650/750

Back of Cab or End of Frame

- The 2 blunt-cut pass-thru wires terminate at Pins 6 and 10 of the Body Builder Connector. The connector is located either at the back of cab or end of frame along the left hand frame rail, depending on vehicle options. –See Body Builder Layout Book for complete pin out.

Customer Accessible Signal Circuit Description

F-650/750 6.8L Gasoline and 6.7L Diesel					
CUSTOMER ACCESS SIGNAL CIRCUITS - Found: Blunt-cut & taped, in Customer access harness under driver's side dash.					
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description	
Gray / Brown	TRO P	CET22	OUTPUT PARK-Only	**6.7L Diesel - PCM Pin C1232T-20**	**6.8L Gasoline – PCM Pin C175B-19**
				- An output from the PCM that indicates when the Transmission Range Sensor is indicating that the Transmission is in the Park Position. The Low Side driver (160mA max.) in the PCM will pull this output to ground when active (Transmission is in the PARK Position). To properly reference this output, the customer supplied external controller/device needs to pull this output up to VPWR with a 10K Ohm resistor. Thus when the output is active, the voltage at this output will be 0 volts. When this output is not active, the output will be pulled up to VPWR by the 10K Ohm pull up resistor.	
Green / White	TRO N	CET21	OUTPUT NEUTRAL -Only	**6.7L Diesel - TCM Pin C1232T-24**	**6.8L Gasoline – PCM Pin C175B-43**
				- An output from the PCM that indicates when the Transmission Range Sensor is indicating that the Transmission is in the Neutral Position. The Low Side driver (160mA max.) in the PCM will pull this output to ground when active (Transmission is in the Neutral Position). To properly reference this output, the customer supplied external controller/device needs to pull this output up to VPWR with a 10K Ohm resistor. Thus when the output is active, the voltage at this output will be 0 volts. When this output is not active, the output will be pulled up to VPWR by the 10K Ohm pull up resistor	
Violet / Orange	VS OUT	VMC05	OUTPUT Vehicle Speed	**6.7L Diesel - PCM Pin C1232B-5**	**6.8L Gasoline – PCM Pin C175B-78**
				- An output from the PCM that provides 8000 pulses per mile signal with a 50% duty cycle. The low side driver in the PCM will switch the output off and on (off will allow the output to be pulled up close to VPWR), (on will put the output to 0 volts). To properly reference this output, the customer supplied external controller/device needs to pull this output down to ground with a 10K Ohm resister.	
Blue	CTO	CE913	OUTPUT Engine Speed	**6.7L Diesel - PCM Pin C1232B-10**	**6.8L Gasoline – PCM Pin C175B-77**
				- An output from the PCM that indicates a Clean Tachometer Output to provide an indication of engine RPM. The low side driver in the PCM will switch the output off and on (off will allow the output to be pulled up close to VPWR), (on will put the output to 0 volts), at a Frequency:((Engine RPM * Number of cylinders) / 120), Both with a duty cycle of 50%. To properly reference this output, the customer supplied external controller/device needs to pull this output down to ground with a 10K Ohm resister.	
White / Violet	PARK BRAKE	CMC25	OUTPUT Park Brake	**Hydraulic Brakes - BCM Pin C2280C-7**	**Air Brakes – GFM pin C240B-9**
				- Ground Output Signal wire - NOTE: The Body Control Module (BCM) park brake input also uses this signal. The BCM park brake input cannot source any current. The body builder must provide a high impedance circuit (such as a Field Effect Transistor) with a 20 kilo-ohm or larger resistor to prevent faulting the Body Control Module. See schematic in the Body Builder Layout Book.	
Brown / White	BB CAV 6	CAC09	PASS-THRU	- Pass thru wire, terminating in the body builder connector, pin 6	
White	BB CAV 10	CAC10	PASS-THRU	- Pass thru wire, terminating in the body builder connector, pin 10	

Battery Voltage Sources (VPWR)

F-650/750 6.8LGasoline and 6.7L Diesel				
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
Yellow / Gray	VPWR3	CBB35	OUTPUT RUN / START	- Ignition Hot-in Run / Start - 10-amp fused (F35 in PDB) circuit, found in customer access circuit harness under driver's side dash.
Yellow	UPFIT RLY 1	CAC05	OUTPUT Upfitter Switch 1	- 25-amp fused output (16awg), found in customer access circuit harness under driver's side dash.
Green / Brown	UPFIT RLY 2	CAC06	OUTPUT Upfitter Switch 2	- 25-amp fused output (16awg), found in customer access circuit harness under driver's side dash.
Violet / Green	UPFIT RLY 3	CAC07	OUTPUT Upfitter Switch 3	- 10-amp fused output (20awg), found in customer access circuit harness under driver's side dash.
Brown	UPFIT RLY 4	CAC08	OUTPUT Upfitter Switch 4	- 15-amp fused output (20awg), found in customer access circuit harness under driver's side dash.

Note: Additional Customer Access Signals found in this bundle not listed here may be found in the Body Builder Layout Book

2. PTO Mode Descriptions

PTO Mode Specifications

Engine	Mode	Max. Load at Transmission PTO Gear	Minimum Engine RPM	Maximum Engine RPM
6.7L Diesel	Stationary	300ft-lbs	900	3000
	Mobile	200ft-lbs	750	3000
	Split-shaft	N/A	700	3000
6.8L Gasoline	Stationary	250ft-lbs	800	2400
	Mobile	125ft-lbs	750	2400

Operating Modes

Stationary Elevated Idle Control mode

-operates in Park at elevated engine speed. The maximum load at the transmission PTO gear are shown in the table below:

Engine	Max. Load at Transmission PTO Gear, Stationary
6.7L Diesel	300ft-lbs
6.8L Gasoline	250ft-lbs

- Intended to be commanded ONLY by applying battery voltage to certain customer-access blunt-cut wire circuits, and adding a target-speed resistor, and is only available when the vehicle road speed signal is zero.
- Includes a circuit which changes from open-circuit to ground when enablers are met that may be used to turn on an indicator lamp while providing battery power to an aftermarket PTO clutch or solenoid.
- Ramp rates are fixed and cannot be altered by the customer.
- Refer to page 10 for example wiring diagrams.

Typical SEIC Engagement Sequence for TorqShift™ PTO

1. 12V is applied to PTQ REQ1 circuit.
2. PCM looks for the following enabling conditions:
   - Parking brake applied.
   - Foot off of service brake
   - Vehicle in PARK (or NEUTRAL)
   - Foot off of accelerator pedal
   - Vehicle speed is 0 mph (stationary)
   - Engine at a stable base idle speed
   - Transmission Oil Temp above 20° F
   - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
   - 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum.

   (See page 13 for complete list of Enable / Disable conditions.)
3. Command is sent to boost the transmission hydraulic line pressure to a minimum of 150 psi, which is used by the aftermarket PTO supplier to hold their PTO Clutch. Command is sent to increase engine speed to 900 rpm
4. The PTO RLY circuit changes from open-circuit to ground. If the up-fitter uses the circuit wiring offered in this bulletin then this will provide battery voltage to the aftermarket PTO solenoid to engage the PTO.
5. Engine RPM ramps to target speed determined by the resistor selection.

Mobile Mode

-Operates in all gears and all vehicle speeds. The engine idle speed is elevated to 750 RPM when the Mobile Mode is initiated. Engine RPM is controlled by the driver through the throttle pedal and is limited to upfitter selected peak engine speed (see RPM Limiting below). The maximum load allowable for mobile mode are shown in the table below.

Engine	Max. Load at Transmission PTO Gear, Mobile
6.7L Diesel	200ft-lbs
6.8L Gasoline	125ft-lbs

-RPM Limiting (2018 model year and later 6.7L diesel vehicles only)- RPM limiting controls engine speed in Mobile Mode below a selectable maximum threshold. Maximum RPM is determined by the resistor installed between the PTO_REF and PTO RPM circuits. See table A for RPM / resistor values.

- Transmission behavior changes in Mobile Mode due to upshifting performance; e.g., it is possible for a customer to reach max. rpm in a lower gear, and the transmission is unable to accelerate – or upshift – to the next gear.
- If this action is not desired, the operator can
  1) ease up on the accelerator pedal and receive an upshift, or
  2) put the transmission in manual mode and select the gears manually
- Selected target RPM has a margin of +/- 15% based on transient conditions (for example, descending a grade).
- Mobile PTO may overshoot selected the RPM by 100-200 RPM for drivability.
  - Note: An additional aftermarket rev limiter may be required to prevent over speed damage to attached pumps and equipment.
- If the PTO feature is used for extended periods of time without vehicle movement it is recommended to switch to Stationary Mode.
- Refer to page 11 for example wiring diagrams.

Typical Mobile Mode Engagement Sequence

1. 12V applied to PTO REQ2 circuit
2. PCM looks for the following enabling conditions:
   - Transmission Oil Temp above 20° F
   - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
   - 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum

   (See page 13 for complete list of Enable / Disable conditions.)
3. PCM looks for voltage on PTO RPM circuit for maximum target RPM.
4. Command is sent to boost transmission hydraulic line pressure to a minimum of 150 psi, which is used by the aftermarket PTO supplier to hold their PTO Clutch
5. The PTO RLY circuit changes from open-circuit to ground. If the up-fitter uses the circuit wiring offered in this bulletin then this will provide battery voltage to the aftermarket PTO solenoid to engage the PTO.
6. Engine idle increases to 750 RPM.

Split Shaft Mode (Diesel Only)

- To install Split-Shaft mode, wire according to the diagram shown on page 12. Select elevated idle speed by installing a resistor (which provides voltage to PTO RPM input) as indicated in the wiring diagram. Split-Shaft mode requires that supply voltage (nominal 12vdc) be applied to both the **PTO REQ1** and **PTO REQ2** circuits.
  - Refer to page 12 for example wiring diagrams.

Split Shaft Engagement procedure:

(See page 13 for complete list of Enable / Disable conditions.)

1. Ensure the following engine is running and the engine coolant temp is above 20° F.
2. Apply park brake.
3. Disconnect vehicle drive train (transmission in NEUTRAL, 4x4 DISENGAGED) and engage PTO load.
4. With foot off both the service brake and accelerator pedals, turn Split-Shaft PTO on.
5. While pressing the service brake, shift transmission into drive.
6. The system will shift the transmission into 4th gear, lock the converter and then ramp up to the target idle speed in a controlled manner. Release the service brake*.

*If vehicle unexpectedly lurches or moves upon releasing service brake, immediately depress brake pedal and shift transmission into PARK or NEUTRAL to secure vehicle. Contact Upfitter immediately

Battery Charge Protect (BCP):

-When 12V is applied to the BCP SW circuit, the engine speed goes immediately to 600. From this state, the PCM uses battery voltage as well as ambient air temp., engine oil temperature information to raise engine speed higher to maintain battery charge. Maximum engine speed in BCP mode is 1200 rpm. Loss of an operating condition after BCP is engaged will require the BCP switch to be cycled before BCP will re-engage.

- BCP CANNOT BE ACTIVE WHEN SEIC OR PTO MODES ARE ACTIVE
- A Resistor must be installed between PTO REF (VREF_C for 6.8L) and PTO RPM for both Diesel and Gasoline engines.
- Auto Entry: The BCP and Mobile operation modes allow PTO to engage automatically once the engine started provided the input switch is left in the on position prior to starting the engine. However, loss of an operating condition after PTO is initially engaged will require the switch to be cycled before PTO will re-engage.
- Refer to page 10 for example wiring diagram

Typical Battery Charge Protect Mode Engagement Sequence:

1. 12V applied to BCP SW circuit
2. PCM looks for the following enabling conditions:
   - Parking brake applied.
   - Foot off of service brake
   - Vehicle in PARK (or NEURTRAL)
   - Foot off of accelerator pedal
   - Vehicle speed is 0 mph (stationary)
   - Engine at a stable base idle speed
   - Transmission Oil Temp above 20° F
   - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
   - 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum.
3. PCM looks for a valid voltage between 0.2 to 4.7 Volts on the PTO RPM circuit
4. Vehicle idle fluctuates slightly as PCM enters BCP mode.
5. The BCP LP circuit changes from open-circuit to ground. This is intended to provide a ground path for a BCP indicator lamp.

   NOTE: BCP is a smart system. Engine idle will not increase unless the vehicle senses an increase in electrical demand. Under periods of low electrical demand, the operator may not notice any change in engine RPM. It is recommend that the modifier install an indicator lamp to alert the operator that BCP is properly engaged.

Additional notes:

Adaptive Cooling
This PCM strategy automatically restricts engine power when it senses an over-temperature condition, and may interrupt the SEIC-PTO operation. Typically, the over-temperature condition it reacts to will also show up on the temperature gage on the instrument panel. Elevated engine speed, typical of SEIC operation, may help avoid Adaptive Cooling occurrence due to the resultant additional engine and transmission coolant flow. However, depending on the auxiliary PTO power being demanded, 900 rpm may not be enough to prevent the power train from entering Adaptive Cooling mode, but 1500 rpm may.

Input Resistor
ALL modes (SEIC, PTO) require usage of an input resistor. The resistor value may be obtained in Tables A & B.

Table A- 6.7L Diesel Resistor Charts

6.7L Diesel Engine

Stationary Mode			**Split Shaft Mode**			**Mobile Mode**		
Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)	Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)	Maximum Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)
900	54050	0.400	700	54050	0.400	900	54050	0.400
1000	35098	0.590	800	36247	0.574	1000	35098	0.590
1200	19491	0.971	1000	20795	0.922	1200	19491	0.971
1400	12677	1.352	1200	13810	1.270	1400	12677	1.352
1600	8858	1.733	1400	9830	1.617	1600	8858	1.733
1800	6415	2.114	1600	7258	1.965	1800	6415	2.114
2000	4718	2.495	1800	5460	2.313	2000	4718	2.495
2200	3471	2.876	2000	4132	2.661	2200	3471	2.876
2400	2515	3.257	2200	3111	3.009	2400	2515	3.257
2600	1759	3.638	2400	2301	3.357	2600	1759	3.638
2800	1147	4.019	2600	1644	3.704	2800	1147	4.019
3000	641	4.400	2800	1099	4.052	3000	641	4.400
			3000	641	4.400			
** Voltages are exact to achieve RPM shown. Resistors are standard 5% values (1 watt) and yield RPM values +/- 32rpm						**Commanded by throttle to maximum selected RPM (+/- 15%) – See Description for more information.**		

Table B: 6.8L Gasoline Resistor Chart

6.8L Gas Engine Stationary Mode

Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)	Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)
800	54050	0.40	1700	4168	2.65
900	31454	0.65	1800	3403	2.90
1000	21411	0.90	1900	2760	3.15
1100	15735	1.15	2000	2212	3.40
1200	12086	1.40	2100	1738	3.65
1300	9542	1.65	2200	1326	3.90
1400	7668	1.90	2300	963	4.15
1500	6230	2.15	2400	641	4.40
1600	5092	2.40			

Mobile Mode

Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)
Minimum 750 (Commanded by throttle)	360	4.644269

** Voltages are exact to achieve RPM shown.
Resistors are standard 5% values (1 watt) and yield RPM values +/- 32rpm

Circuit Descriptions for PTO Modes

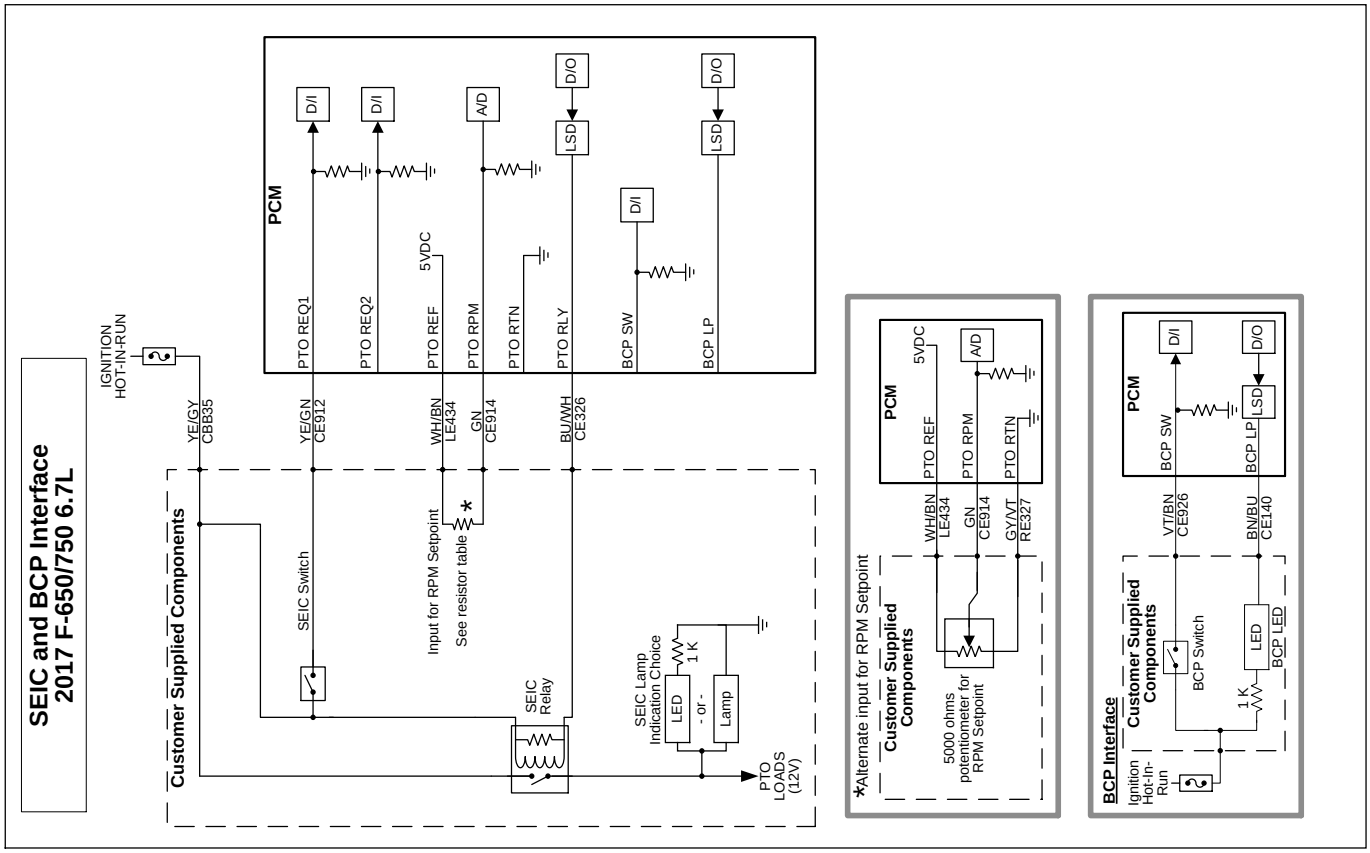
All circuits lead back to pins on the PCM.

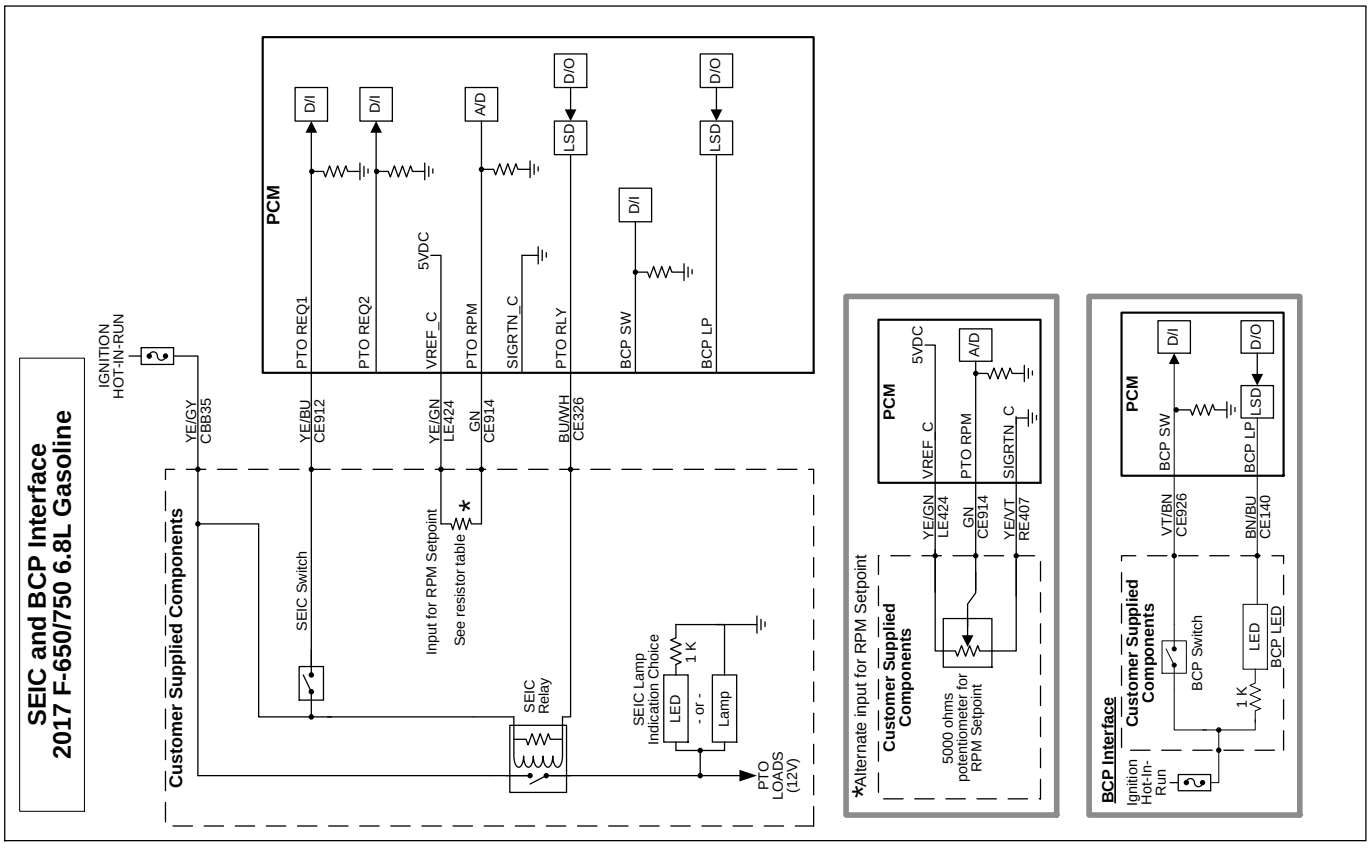
F-650/750 – 6.7l Diesel				
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
Yellow / Green	PTO REQ1	CE912	INPUT (VPWR)	**6.7L Diesel - PCM Pin C1232B-6** • Applying vehicle battery voltage to this wire initiates SEIC **Stationary Mode** process. • Signals TorqShift™ transmission to enter SEIC Stationary Mode strategy. • Verifies safety enablers. • Turns off OBD and other emission-related monitoring. • Elevates engine speed to target found at PTO-RPM circuit. • Invokes the PTO relay circuit when safety enablers are met. • Looks for the target engine speed requested at the PTO_RPM circuit using a resistor or POT.
Blue / Red	PTO REQ2	CE933	INPUT (VPWR)	**6.7L Diesel - PCM Pin C1232B-4** • Applying vehicle battery voltage to this wire initiates **Mobile PTO Mode.** • Signals TorqShift™ transmission to enter Mobile Mode strategy. • Verifies safety enablers. • Turns off OBD and other emission-related monitoring. • Invokes the PTO relay circuit when safety enablers are met. • Requires valid resistance on PTO_RPM input for system to function
Blue / White	PTO RLY	CE326	OUTPUT	**6.7L Diesel - PCM Pin C1232B-11** • A low-side driver, changing from "open-circuit" to "ground" indicating that the engine is ready for the PTO operation to begin and that a PTO load may be applied. • Intended for powering a PTO indicator lamp, or turn on a relay coil (not to exceed 1 amp). LED lights require adding a resistor in series.
Green	PTO RPM	CE914	INPUT (resistor)	**6.7L Diesel - PCM Pin C1232B-8** • Requires the addition of a resistor or potentiometer for any SEIC / PTO mode. • Resistor / potentiometer selection determines the fixed or variable engine target speed. • Combine in circuit with PTO-VREF and PTO-GND. • Speed range available: 900 rpm to 3000 rpm (700 min RPM for split shaft operation).
White / Brown	PTO REF	LE434	Reference Voltage	**6.7L Diesel - PCM Pin C1232B-55** • A 5-volt reference, buffered against shorts to ground or power, used to complete the resistor circuit for engine speed selection.
Gray / Violet	PTO RTN	RE327	PCM Ground	**6.7L Diesel - PCM Pin C1232B-22** • A ground reference, buffered, used to complete the resistor circuit for engine speed selection.
Violet / Brown	BCP SW	CE926	INPUT (VPWR)	**6.7L Diesel - PCM Pin C1232B-21** • Applying vehicle battery voltage to this wire begins BCP. • BCP regulates engine speed between 600 to1200 rpm to maintain required charge system voltage
Brown / Blue	BCP LP	CE140	OUTPUT	**6.7L Diesel - PCM Pin C1232B-20** • A low-side driver, changing from "open-circuit" to "ground" indicating that BCP is in effect. • Intended for powering an indicator lamp.

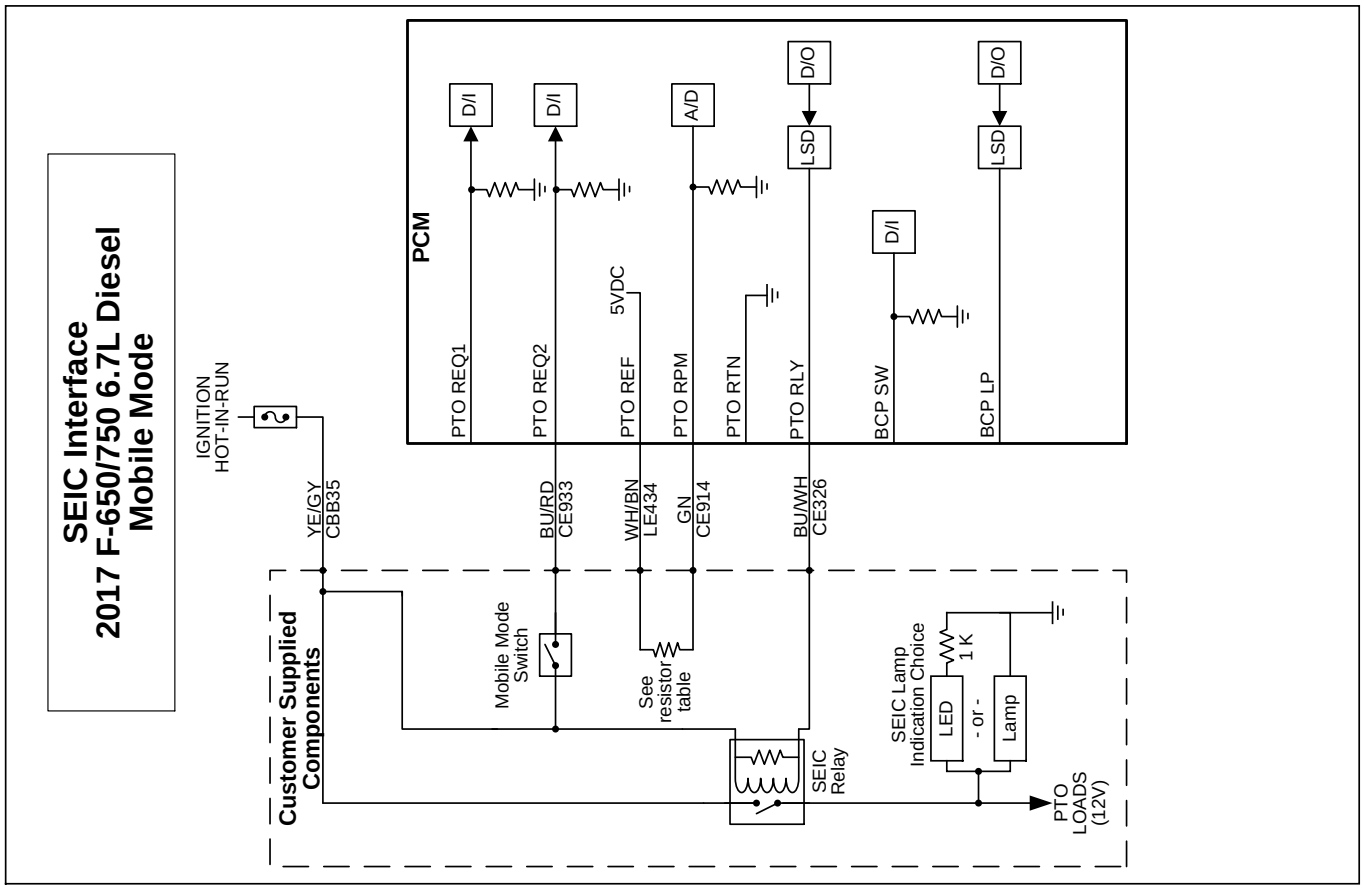
Circuit Descriptions for PTO Modes (Cont)

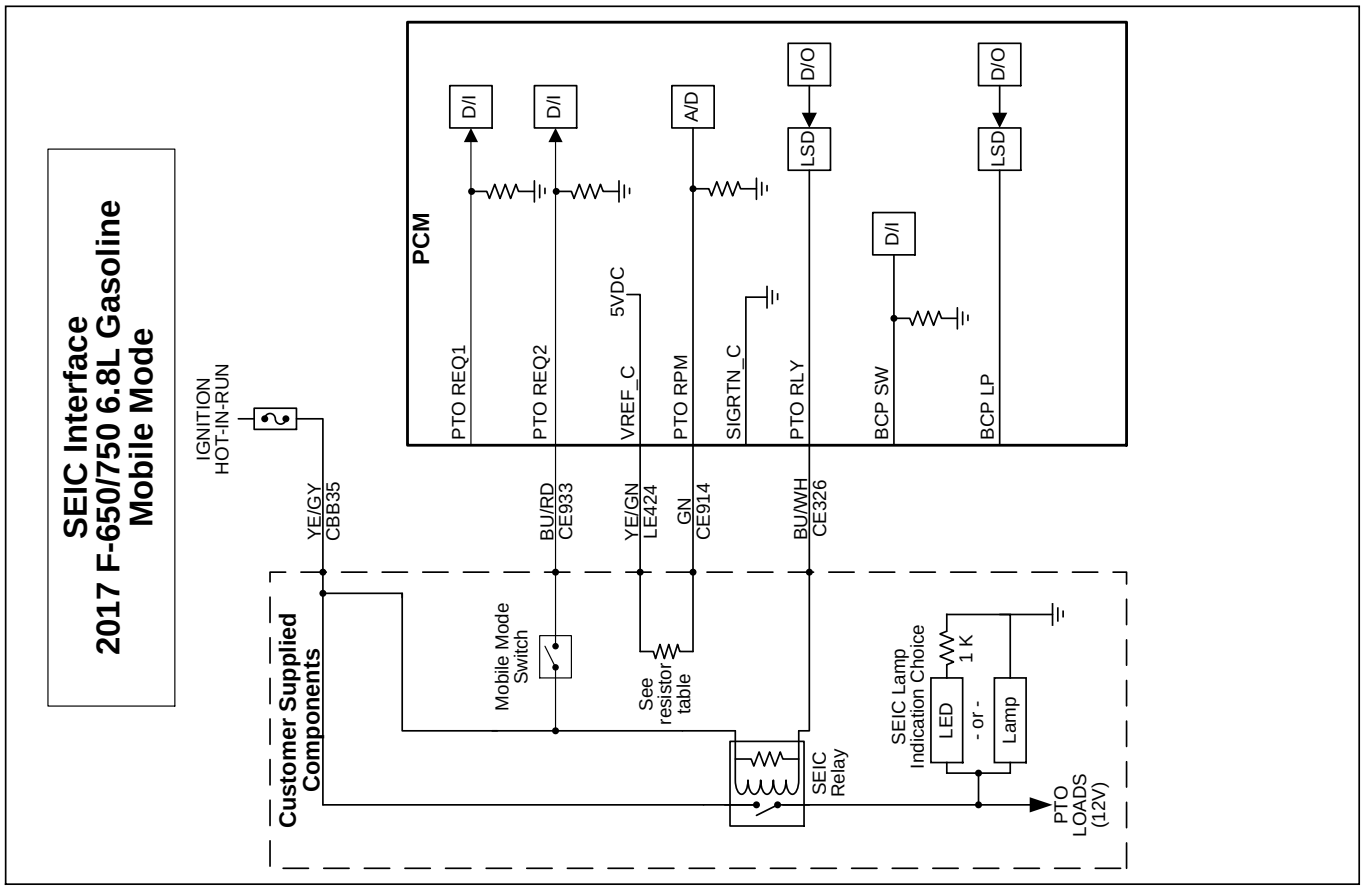
All circuits lead back to pins on the PCM.

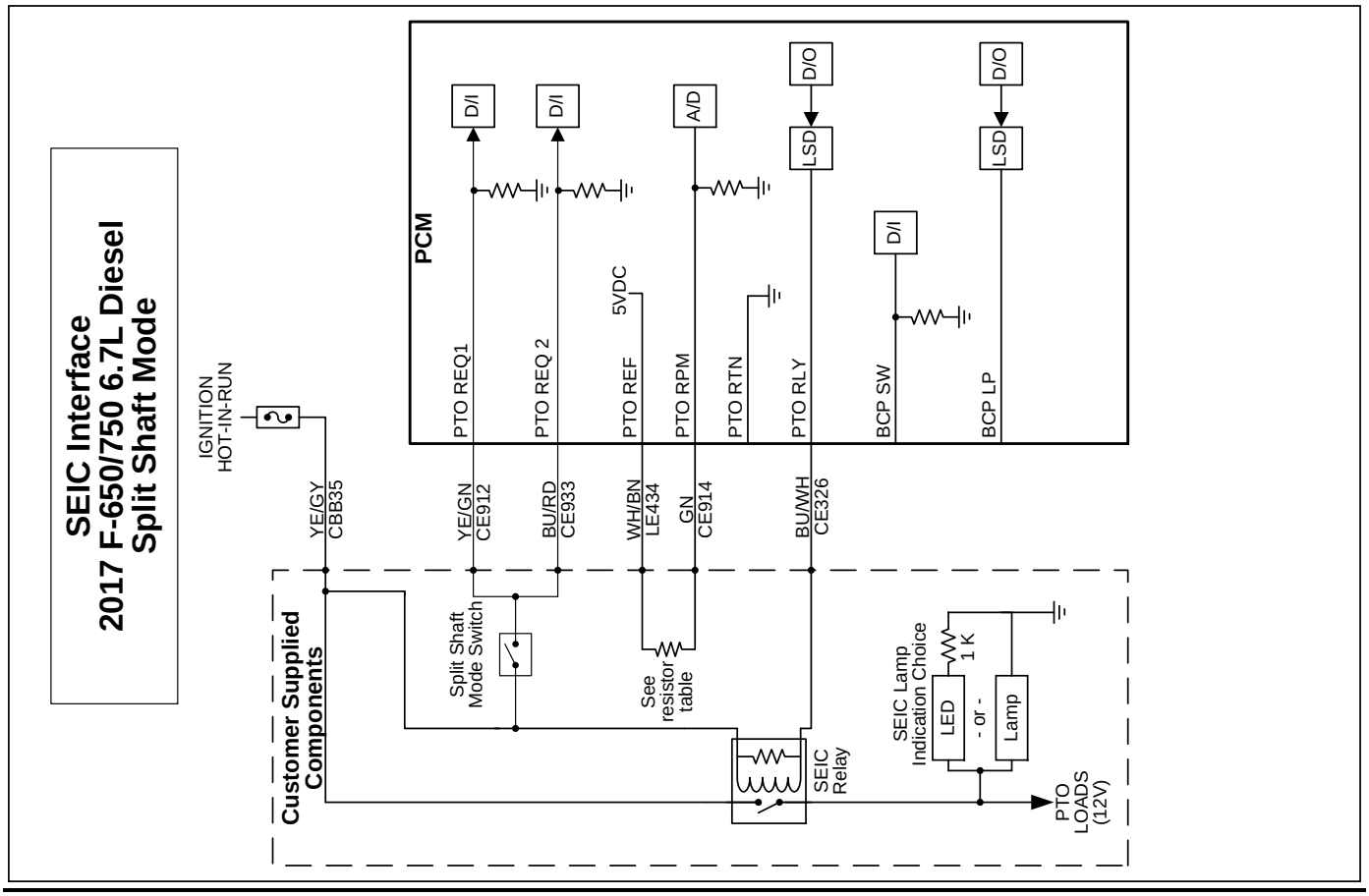
F-650/750 – 6.8L Gasoline Engine PCM				
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
Yellow / Blue	PTO REQ1	CE912	INPUT (VPWR)	**PCM Pin C175B-84** • Applying vehicle battery voltage to this wire initiates SEIC **Stationary Mode** process. • Signals TorqShift™ transmission to enter SEIC Stationary Mode strategy. • Verifies safety enablers. • Turns off OBD and other emission-related monitoring. • Elevates engine speed to target found at PTO-RPM circuit. • Invokes the PTO relay circuit when safety enablers are met. • Looks for the target engine speed requested at the PTO_RPM circuit using a resistor or POT
Blue / Red	PTO REQ2	CE933	INPUT (VPWR)	**PCM Pin C175B-4** • Applying vehicle battery voltage to this wire initiates **Mobile PTO Mode.** • Signals TorqShift™ transmission to enter Mobile mode strategy. • Verifies safety enablers. • Turns off OBD and other emission-related monitoring. • Invokes the PTO relay circuit when safety enablers are met. • Requires valid resistance on PTO_RPM input for system to function
Blue / White	PTO RLY	CE326	OUTPUT	**PCM Pin C175B-98** • A low-side driver, changing from "open-circuit" to "ground" indicating that the engine is ready for PTO operation to begin and that a PTO load may be applied. • Intended for powering a PTO indicator lamp, or turn on a relay coil (not to exceed 1 amp). LED lights require adding a resistor in series.
Green	PTO RPM	CE914	INPUT (resistor)	**PCM Pin C175B-85** • Requires the addition of a resistor or potentiometer for any SEIC / PTO mode. • Resistor / potentiometer selection determines the fixed or variable engine target speed. • Combine in circuit with PTO_VREF (+5VDC). • Speed range available: 910 rpm to 2400 rpm
Yellow / Green	VREF_C	LE424	Reference Voltage	**PCM Pin C175B-52** • A +5-volt reference, buffered against shorts to ground or power, used to complete the resistor circuit for engine speed selection.
Yellow / Violet	SIGRTN_C	RE407	PCM Ground	**PCM Pin C175B-51** • A ground reference, buffered, used to complete the resistor circuit for engine speed selection.
Violet / Brown	BCP SW	CE926	INPUT (VPWR)	**PCM Pin C175B-82** • Applying vehicle battery voltage to this wire begins BCP. • BCP regulates engine speed between 600 to1200 rpm to maintain required charge system voltage
Brown / Blue	BCP LP	CE140	OUTPUT	**PCM Pin C175B-17** • A low-side driver, changing from "open-circuit" to "ground" indicating that BCP is in effect. • Intended for powering an LED lamp (40mA max.).

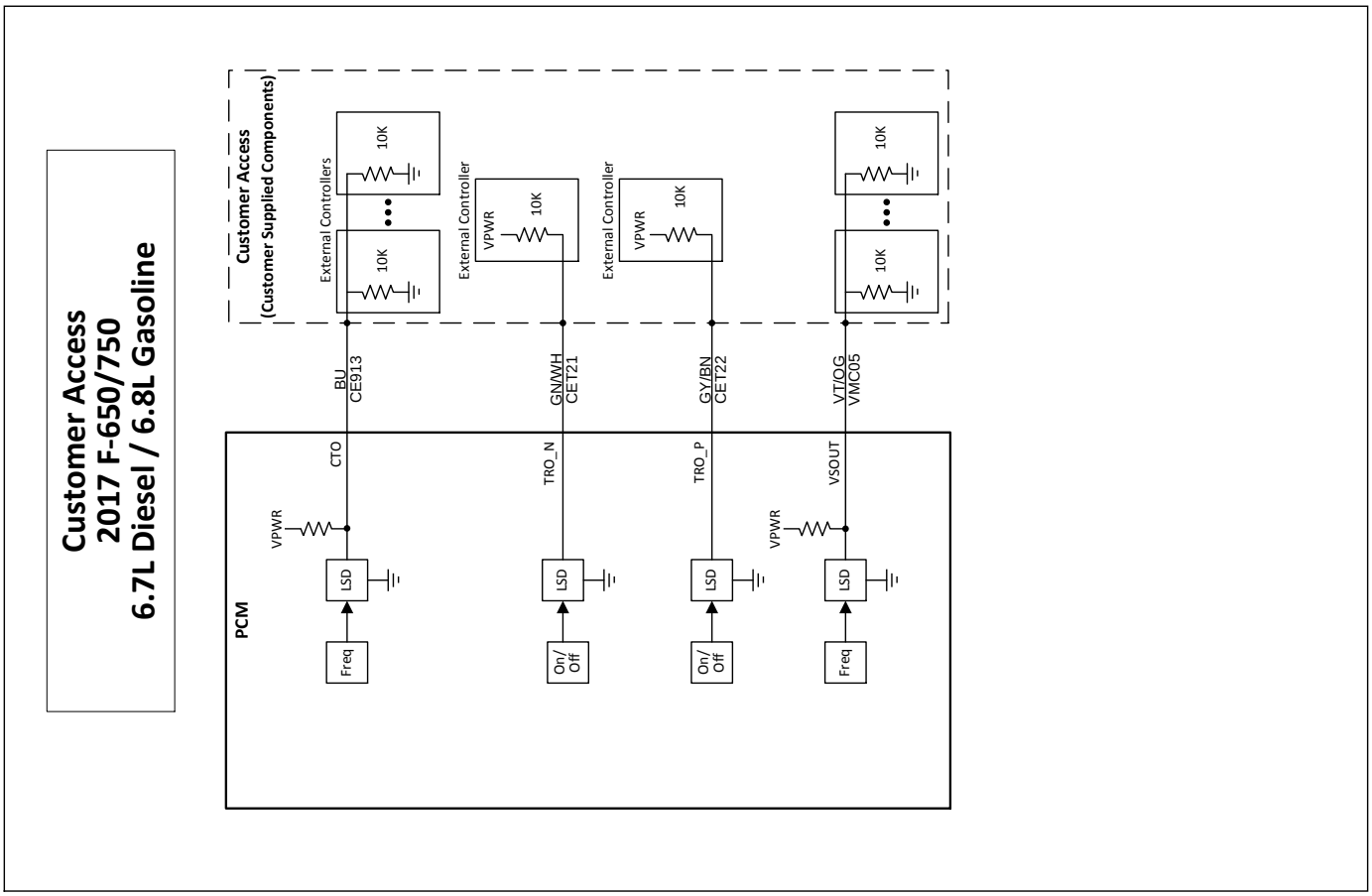

SEIC and BCP Interface
2017 F-650/750 6.7L
IGNITION
HOT-IN-RUN
YE/GY
CBB35
Customer Supplied Components
SEIC Switch
YE/GN
CE912
Input for RPM Setpoint
See resistor table
WH/BN
LE434
GN
CE914
BU/WH
CE326
SEIC Relay
SEIC Lamp
Indication Choice
LED
- or -
1 K
Lamp
PTO
LOADS
(12V)
PCM
PTO REQ1
PTO REQ2
PTO REF
5VDC
PTO RPM
PTO RTN
PTO RLY
BCP SW
BCP LP
D/I
A/D
LSD
D/O
*Alternate input for RPM Setpoint
5000 ohms
potentiometer for
RPM Setpoint
GY/VT
RE327
BCP Interface
Ignition
Hot-In-
Run
BCP Switch
1 K
LED
BCP LED
VT/BN
CE926
BN/BU
CE140


SEIC and BCP Interface
2017 F-650/750 6.8L Gasoline
IGNITION
HOT-IN-RUN
YE/GY
CBB35
Customer Supplied Components
SEIC Switch
YE/BU
CE912
Input for RPM Setpoint
See resistor table
YE/GN
LE424
GN
CE914
BU/WH
CE326
SEIC Relay
SEIC Lamp
Indication Choice
LED
- or -
1 K
Lamp
PTO
LOADS
(12V)
PCM
PTO REQ1
PTO REQ2
VREF_C
5VDC
PTO RPM
SIGRTN_C
PTO RLY
BCP SW
BCP LP
D/I
A/D
LSD
D/O
*Alternate input for RPM Setpoint
5000 ohms
potentiometer for
RPM Setpoint
YE/VT
RE407
BCP Interface
Ignition
Hot-In-
Run
BCP Switch
1 K
LED
BCP LED
VT/BN
CE926
BN/BU
CE140


SEIC Interface
2017 F-650/750 6.7L Diesel
Mobile Mode
IGNITION
HOT-IN-RUN
YE/GY
CBB35
PCM
PTO REQ1
PTO REQ2
PTO REF
PTO RPM
PTO RTN
PTO RLY
BCP SW
BCP LP
D/I
D/I
A/D
D/O
LSD
5VDC
BU/RD
CE933
WH/BN
LE434
GN
CE914
BU/WH
CE326
Customer Supplied
Components
Mobile Mode
Switch
See
resistor
table
SEIC
Relay
SEIC Lamp
Indication Choice
LED
1 K
- or -
Lamp
PTO
LOADS
(12V)


SEIC Interface
2017 F-650/750 6.8L Gasoline
Mobile Mode
IGNITION
HOT-IN-RUN
YE/GY
CBB35
PCM
PTO REQ1
PTO REQ2
VREF_C
PTO RPM
SIGRTN_C
PTO RLY
BCP SW
BCP LP
D/I
D/I
A/D
D/O
LSD
5VDC
BU/RD
CE933
YE/GN
LE424
GN
CE914
BU/WH
CE326
Customer Supplied
Components
Mobile Mode
Switch
See
resistor
table
SEIC
Relay
SEIC Lamp
Indication Choice
LED
1 K
- or -
Lamp
PTO
LOADS
(12V)


SEIC Interface
2017 F-650/750 6.7L Diesel
Split Shaft Mode
IGNITION
HOT-IN-RUN
YE/GY
CBB35
PCM
PTO REQ1
PTO REQ 2
PTO REF
PTO RPM
PTO RTN
PTO RLY
BCP SW
BCP LP
D/I
D/I
A/D
D/O
LSD
D/I
D/O
LSD
5VDC
YE/GN
CE912
BU/RD
CE933
WH/BN
LE434
GN
CE914
BU/WH
CE326
Customer Supplied
Components
Split Shaft
Mode Switch
See
resistor
table
SEIC
Relay
SEIC Lamp
Indication Choice
LED
- or -
Lamp
1 K
PTO
LOADS
(12V)



6.7L Diesel and 6.8L Gasoline SEIC / BCP Enable/Disable Conditions

Vehicle Conditions to Enable SEIC (all are required)	Vehicle Conditions that Disable SEIC (any one required - See Note-1)	SEIC	Split Shaft (Diesel only)	Mobile Mode
Parking brake applied.	Parking brake disengaged.	Yes	Yes	No
Foot off of service brake	Depressing service brake	Yes	See note-2	No
Vehicle in PARK (or NEURTRAL)	Vehicle taken out of PARK (or NEUTRAL)	Yes	See note-2	No
Foot off of accelerator pedal	Accelerator pedal depressed	Yes	Yes	No
Vehicle speed is 0 mph (stationary)	Vehicle speed is not 0 mph (stationary)	Yes	Yes	No
Engine at a stable base idle speed		Yes	Yes	No
Transmission Oil Temp above 20° F	Transmission Oil Temperature (TOT) exceeds 240° F.	Yes	Yes	Yes
Engine Coolant Temperature (ECT) 20° F minimum (6.7L)	Engine Coolant Temperature (ECT) exceeds 234° F	Yes	Yes	Yes
Engine Coolant Temperature (ECT) 40 degree F minimum. (6.8L)	Engine Coolant Temperature Limit (ECT)	Yes	N/A	Yes
	Catalyst Temperature Limit	Yes	Yes	Yes

Note 1: A "change-of-state" at the "PTO-Request" circuit is required to re-invoke SEIC. When a disabler is seen by the PCM the "PTO-Indicator" circuit changes from "ground-source" to "open-circuit", SEIC drops out, and the engine speed returns to base idle.

To re-initiate SEIC the operator must turn off the aftermarket PTO switch (removing command voltage to the "PTO-Mode" circuit) and turn it back on again.

Note 2: Please see Split Shaft Mode in Special Situations.

4. SEIC / PTO – General System Behavior

• To guarantee full advertised torque capability at the automatic transmission PTO gear and through the aftermarket PTO clutch, the hydraulic line pressure serving the aftermarket PTO clutch must be elevated. Applying battery voltage to the PTO circuit is the signal to the transmission to enter SEIC strategy and these important functions. This applies to both stationary and mobile PTO operations.

- **If an SEIC disabler occurs in any mode:**
  - **ALL engines will require a "change-of-state", meaning the operator is required to turn off voltage to the "PTO-Request" circuit, and back on again to re-invoke SEIC and PTO operation.**

- If the Transmission Oil Temperature (TOT) sensor reaches 240°F, the PTO system may disengage, preventing torque from being delivered to the aftermarket transmission PTO.

- SEIC/PTO strategy function in the PCM is not affected by the loss of vehicle battery electrical power.

- SEIC Ramp Rate (fixed, not programmable):
  - When first applying battery voltage to the PTO circuit the PCM directs the engine to ramp to the initial target that it sees at the RPM circuit at a rate of 200 rpm/sec

  - The SEIC system offers buffered PCM voltage and ground circuits to complete the resistor circuits for engine speed.

  - If there is a high electrical demand on the chassis battery, such as from aftermarket inverters or generators, etc., the actual elevated idle engine speed may vary with that demand for any given resistance in the SEIC circuit.

SEIC / PTO – General System Behavior (cont.)

- **Correlation between engine speed and resistor values:**
  - Both the 6.7L Diesel and 6.8L Gasoline applications uses a 5 volt reference signal and ground for the PTO_RPM input circuit.

  - Normal base engine calibration allows approximately +/-50 rpm fluctuation. If any factory vehicle accessories are used during SEIC, e.g. a/c, defroster, etc., then that fluctuation may increase to approximately +/-100 rpm or more.

  - The sudden loss of aftermarket PTO hydraulic pressure during SEIC/PTO operation, like a ruptured hose, may send SEIC engine speed to near 3000 rpm. It is recommended that a hydraulic pressure switch linked to SEIC/PTO be added to disable SEIC/PTO when a hose ruptures.

  - Because of a service brake circuit characteristic at engine-start, invoking SEIC may cause the diagnostic error code FFG_BOO to get flagged (recorded in the PCM). To avoid this, simply tap the service brake pedal sometime after engine-start and prior to invoking SEIC. Once the code is set, SEIC may not be available until it is erased.

5. APPENDIX

Vocabulary / Definitions

PTO Applications: Includes all forms of mechanical power, using the vehicle powertrain as the source, including transmission side-mounted PTO, split-shaft PTO, crankshaft PTO, and FEAD-mounted clutch-pumps, air compressors, and generators.
Clutch-Pump: A type of PTO that is driven by the vehicle engine crankshaft through the FEAD pulley system.
PCM: Powertrain Control Module
FEAD: Front End Accessory Drive (belt and pulley drive system)
SEIC: Stationary Elevated Idle Control
VSO, VSOUT: Vehicle Speed Out – see Customer Accessible Signal Description
TPO: Throttle Position Out. Direct customer access not provided.
ETC: Engine Coolant Temperature
CTO: Clean Tach Out - Customer Accessible Signal Description
VPWR: Vehicle Power Battery Voltage.
BCP_IL / BCP_SW: Battery Charge Protection Illumination Lamp / Battery Charge Protection Switch
Intermittent Duty Usage: 5 minutes out of a 15 minute period or less of continuous operation.
Continuous Duty Usage: Greater than 5 minutes out of a 15 minute period of continuous operation.
Change-of-State: Part of the SEIC strategy. If any condition is met that disables SEIC, the operator is required to turn the PTO switch OFF and back ON again before SEIC will allow elevated idle to return.
TRO_N, TRO_P: Transmission Range Output, indicating NEUTRAL ONLY, or PARK-ONLY
BCM: Body Control Module, located at lower passenger-side of instrument panel